Name: _____

Practice Exam 3

Statistics 0800
Fall 2013
Dr. Nancy Pfenning

This is a closed book exam worth 150 points. You are allowed to bring a calculator and a two-sided sheet of notes.

1. (5 pts.) A group of commuting students gets to school either by bus, car, or walking. The probability of commuting by bus is .3, by car is .2. What was the probability of not commuting by bus?

2. (20 pts.) In a group of commuting students, the probability of being female is .6, and the probability of walking to school is .5. The probability of being female and walking to school is .3.

   (a) Are being female and being male mutually exclusive? _____

   (b) Are being female and walking to school independent?_____

   (c) What is the probability of being female or walking to school? _____

   (d) What is the probability of being male and commuting by bus or car? _____

3. (10 pts.) Four flips in a row of a balanced coin result in heads.

   (a) The probability that the next flip will result in tails is
   (a) $\frac{1}{2}$ (b) less than $\frac{1}{2}$ (c) more than $\frac{1}{2}$

   (b) In answering part (a), people may be misled by (i) confusion of the inverse
   (ii) gambler's fallacy (iii) expected value (iv) representativeness
   (v) forgotten base rates

4. (10 pts.) Two cards are picked at random *with replacement* from four cards, consisting of one heart, one diamond, one club, and one spade.

   (a) What is the probability that the first card is a heart and the second is a spade?_____

   (b) When cards are picked *with replacement*, the selections are
   (i) dependent (ii) independent (iii) mutually exclusive

5. (15 pts.) A die is rolled twice.

   (a) What is the probability that neither roll is a two?_____

   (b) What is the probability of rolling at least one two?_____

   (c) What interpretation of probability applies here?
   (i) relative frequency (ii) personal probability (iii) subjective probability

6. (5 pts.) Here are the probabilities of various year levels for students in a Statistics class:

Number	1	2	3	4
Probability	.1	.5	.3	.1

   What is the expected year level?_____

7. (5 pts.) How can we correctly explain coincidences?

   (a) There is simply no explanation.

   (b) Religious or mystical forces cause bizarre things to happen in our lives.

   (c) If many unusual events are possible, in the long run some of them will occur.

   (d) Being skeptical about the possibility of an event can impact its probability.

8. (5 pts.) In a statistics class, 44% of students rated their driving as better than average for the class, whereas only 4% rated their driving as worse than average. This is an example of (i) anchoring (ii) availability heuristic (iii) representativeness
   (iv) forgotten base rates (v) optimism (vi) conservatism

9. (5 pts.) A public radio station mails solicitations for contributions, with suggested levels that are actually higher than what they realistically expect. They are hoping to take advantage of the phenomenon of (a) anchoring (b) availability heuristic (c) representativeness (d) forgotten base rates (e) optimism (f) over-confidence (g) conservatism

10. (5 pts.) The probability that at all three people in a group of three have *different* birthdays is
(a) 0 (b) $\frac{364}{365} \times \frac{363}{365}$ (c) $1 - \frac{364}{365} \times \frac{363}{365}$ (d) 1

11. (5 pts.) The probability that at least two people in a group of three have the *same* birthday is
(a) 0 (b) $\frac{364}{365} \times \frac{363}{365}$ (c) $1 - \frac{364}{365} \times \frac{363}{365}$ (d) 1

12. (5 pts.) People tend to underweight evidence that does not support their preconceived beliefs, and to overweight evidence that does. This is due to (a) anchoring (b) availability heuristic (c) representativeness (d) forgotten base rates (e) optimism (f) over-confidence (g) conservatism

13. (5 pts.) "Buy one get one free" appeals to people because of
(a) anchoring (b) availability heuristic (c) representativeness (d) forgotten base rates (e) over-confidence (f) conservatism (g) pseudo-certainty effect

14. (5 pts.) Which is more likely?

    (a) The world will end in the next 50 years.

    (b) The world will end in the next 50 years because of nuclear war.

15. (5 pts.) In answering the previous question, people may be misled because of
(a) confusion of the inverse (b) gambler's fallacy (c) expected value (d) representativeness (e) forgotten base rates (f) pseudo-certainty effect

16. (5 pts.) According to the principle of over-confidence, people's assessment of their probability of being correct

    (a) tends to underestimate when they are pretty sure about something

    (b) is generally unbiased when they are pretty sure about something: they tend to underestimate just as often as overestimate

    (c) tends to overestimate when they are pretty sure about something

17. (5 pts.) Media hype can elevate people's personal probability assessments, making them think certain events are more likely than they actually are. This phenomenon is called (a) anchoring (b) availability heuristic (c) representativeness (d) forgotten base rates (e) optimism (f) over-confidence (g) conservatism

18. (30 pts.) Suppose the probability of a federal employee being a spy is .001. If someone is a spy, the lie detector correctly incriminates him or her with probability .80. If someone is not a spy, the lie detector incorrectly incriminates him or her with probability .16.

(a) Draw a tree diagram for this situation, labeling branches for being a spy or not, and for being incriminated by the lie detector or not.

(b) What is the probability of being a spy and being incriminated by the lie detector?_____

(c) What is the probability of not being a spy and being incriminated by the lie detector?_____

(d) What is the overall probability of being incriminated by the lie detector?_____

(e) Given that a person has been incriminated by the lie detector, what is the probability that he or she is actually a spy?_____

(f) People's personal probabilities tend to be incorrect in such situations because they think "probability of being incriminated, given that you are a spy" is the same as "probability of being a spy, given that you are incriminated". This is called
(a) anchoring (b) availability heuristic (c) representativeness
(d) confusion of the inverse (e) optimism (f) over-confidence
(g) conservatism